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PHILIPPINE NATIONAL STANDARD

PNS/BFAD 03:2006
ICS 67.020

Recommended code of practice for the processing and handling of sweet preserves

DEPARTMENT OF TRADE & INDUSTRY PHILIPPINES

BUREAU OF PRODUCT STANDARDS

Foreword

Pursuant to the following provisions of:

1) Section 3 (a) and (b) and 26 (a) of Republic Act 3720, the "Food, Drug and Cosmetic Act" as amended by Section 4 and 19 Executive Order 175 (An Act To Ensure The Safety and Purity of Foods and Cosmetics and the Purity, Safety, Efficacy and Quality Of Drugs And Devices Being Made Available To the Public, vesting the Bureau of Food and Drugs with authority to administer and enforce the laws pertaining thereto, and for other purposes); and,

2) Republic Act 7394, "The Consumer Act of the Philippines," (1992) mandating the Department of Health to "adopt measures to ensure pure and safe supply of foods and establish standards and quality measures for food," Sweet Preserves.

This Code is intended to prescribe guidelines to achieve compliance with the standards for specific sweet preserves packed in glass jars, metal cans, retortable pouches and other appropriate packaging containers.

This Code is hereby promulgated governing the Philippine National Standards for Food herein defined as the Recommended Code of Practice for the Processing and Handling of Sweet Preserves.

1 Scope

This Code prescribes guidelines concerning the receipt of raw materials and ingredients, preparation, heat processing, packaging, labeling, storage and distribution of sweet preserves as defined hereof, in order to conform with the required standards stated in Administrative Order (AO) No. 18 series 2005 (Philippine National Standard on Ethnic Food Products) and PNS/BFAD 02:2005 ICS 67.080. The products may be prepared from fruits, legumes, and gel-like mass (*nata*).

2 Definition of terms

For the purpose of this Code, the following definitions shall apply:

2.1
acid food
any food that has a natural pH of 4.6 or below

2.2
acidified low-acid food
any food that has been treated so as to attain an equilibrium pH of 4.6 or lower after processing

2.3
ambient temperature
refers to the immediate surrounding area for a specified time such as a hot month or cold month

2.4
brix
the concentration of sugar in syrup corresponding approximately to percentage as measured with a refractometer or hydrometer and expressed in °Brix units

2.5
cold storage
holding at temperature not exceeding 5°C

2.6
come-up time
the time, including venting time, which elapses between the introduction of heating medium into the closed retort and/or the time when the temperature in the retort reaches processing temperature

2.7
commercial sterility of thermally processed food
the condition achieved by application of heat, alone or in combination with other appropriate treatment, sufficient to render the food free from microorganisms capable of growing in the food at ambient conditions at which the food is likely to be held during distribution and storage

2.8
equilibrium pH
the pH of the blended or homogenized heat processed food product

2.9
food
any substance, whether processed or semi-processed or raw which is intended for human consumption and including beverages, chewing gum and any substance, which has been used as an ingredient on the manufacture, preparation or treatment of "food"

2.10
food additive
any substance not normally consumed as a food by itself and not normally used as a typical ingredient of the food, whether or not it has nutritive value, the intentional addition of which to food for a technological (including organoleptic) purpose in the manufacturing, processing, preparation, treatment, packaging, transport or holding of such food results or maybe reasonably expected to result (directly or indirectly) in its or its by-product becoming a component of (or otherwise affecting the characteristic of) such food

2.11
food standard
a regulatory guideline that defines the identity of a given food product (i.e. its name and the ingredients used for its preparation) and specifies the minimum quality factors and, when necessary, the required fill of container. It may also include specific labeling requirements other than or in addition to the labeling requirements generally applicable to all prepackaged foods

2.12
good manufacturing practices (GMP)
a quality assurance system aimed at ensuring that products are consistently manufactured, packed, repacked or held to a quality appropriate for the intended use. It is thus concerned with both manufacturing and quality control procedures

2.13
hazard analysis and critical control points (HACCP)
a preventive food quality management system, which identifies, evaluates and controls the hazards significant to food safety specific to a product

2.14
headspace
refers to the volume in a container not occupied by the food and the packing medium

2.15
heat processed food
any food processed by heat to an extent, which results in a product that, is safe and will not spoil under normally expected temperature of non-refrigerated storage and transportation

2.16
hermetically sealed containers
containers, which are sealed to protect the contents against the entry of microorganisms during and after heat processing

2.17
ingredient
any substance including food additive used as a component in the manufacture or preparation of a food and present in the final product in its original or modified form

2.18
label
includes any tag, brand, mark, pictorial, or other descriptive matter, written printed, marked, embossed or impressed on, or attached to a container of food

2.19
labeling
any written, printed or graphic matter (1) upon any article or any of its container or wrappers or (2) accompanying the packaged food

2.20
legumes
all the recognized dried legumes suitable in making preserves, like chickpeas (garbanzos), red beans and white kidney beans

2.21
lot
food produced during a period of time and under more or less the same manufacturing condition indicated by a specific code

2.22
low-acid food
any food, other than alcoholic beverages, with pH above 4.6 and a water activity (a_W) greater than 0.85

2.23
mixed preserves
the combination of at least five fruits and/or legumes processed into sweet preserves

2.24
nata
refers to the thick, translucent and gel-like mass produced by the bacteria, *Acetobacter aceti, subsp. xylinum*, during fermentation of suitable substrate

2.25
pPackaging
the process of packing that is part of the production cycle applied to a bulk product to obtain the finished product. Any material, including painted material, employed in the packaging of a product including any outer packaging used for transportation of shipment. Packaging materials are referred to as primary or secondary according to whether or not they are intended to be in direct contact with the product

2.26
pasteurization
a heating of food at 100°C or below at a specified time

2.27
pH is the intensity or degree of acidity of a food material

2.28
processing
the part of production cycle starting from weighing of raw materials to the obtaining of a bulk product

2.29
refractometer
the instrument used to measure the percent soluble solids, referred to as degree Brix, in concentration of sugars expressed in terms of number of grains of sucrose per 100 g of liquid

2.30
retort
a pressure vessel, equipped with pressure gauge and in-glass mercury thermometer, designed for thermal processing of food packed in hermetically sealed containers

2.31
room temperature
refers to the temperature range of 28°- 30°C, Philippine condition (Zone IV)

2.32
scheduled process
the thermal process chosen by the processor for a given product and container size to achieve at least commercial sterility

2.33
sterilization temperature
the temperature maintained throughout the thermal process as specified in the scheduled process

2.34
sterilization time
the time between the moment the sterilization temperature is achieved and the moment the cooling started

2.35
sweet preserves
food products prepared from fruits, legumes, coconut, or "nata," singly or in combination thereof, packed in syrup and heat processed in hermetically sealed containers to achieve commercial sterility

2.36
thermal process
the heat treatment to achieve commercial sterility and is quantified in terms of time and temperature

2.37
vacuum
a state of pressure reduction below atmospheric

2.38
venting
thorough removal of the air from retorts by steam prior to scheduled process

2.39
water activity (a_w)
the ratio of water vapor pressure of the substance to the vapor pressure of pure water at the same temperature

3 Raw materials, ingredients and packaging requirements

4 Raw materials and ingredients

Raw materials for processing should be within acceptable limits of food safety and quality taking into consideration the physical, chemical and biological hazards associated with it.

3.1.1 Fruits

Fruits like Banana (*Musa* sp. *Saba* or *cardaba*), Jackfruit (*Artocarpus heterophyllus* Lan Syn. *A. integrifolia*), Coconut (*Cocos nucifera*), and sugar palm fruit (*kaong*) (*Arenga pinnata*) should conform to the specifications required for the product. When necessary, these should be properly stored at room temperature or in suitable ripening rooms.

3.1.2 Legumes

Only sound, clean and matured dried legumes conforming to the varieties required for the product should be used for processing. These should be free from infestation, foreign matters and excessive physical damage, and should be stored at room temperature.

3.1.3 *Nata*

Only those prepared and cultured under sanitary conditions should be used for processing. Slabs of *nata* should be cleaned, and those that are cubed or diced should be uniform in size and free from any objectionable odor. These should be stored in potable water at room temperature.

3.1.4 Semi-processed ingredients for mixed preserves

Pre-cooked ingredients for mixed preserves should be prepared and/or accepted to conform to the specifications required for the product. The individual ingredients should be properly packed and stored prior to use.

3.1.5 Sugars

Sugar (sucrose) and/or other carbohydrates like invert sugar, glucose and fructose should be of suitable quality and should conform to the standard specifications for refined sugar and other carbohydrate sweeteners.

3.1.6 Water

Only potable water should be used for the preparation of packing and cooking syrup, and for all the pretreatment and/or processing steps. The standard for potable water is presented in Annex A.

3.1.7 Food additives

All additives, including acidulants, humectants, bleaching agents, softening agents, coloring and flavoring agents shall conform to the standards required by the Bureau of Food and Drugs (BFAD). These should be properly packaged and stored.

3.2 Packaging materials

The packaging materials should be appropriate for the product to be packed and for the expected conditions of storage. These should provide the products appropriate protection and should be sufficiently durable to withstand the mechanical, chemical and thermal stresses encountered during heat processing. All packaging materials should be stored in clean and sanitary manner.

Just before filling, rigid containers shall be cleaned to prevent incorporation of foreign matter into the finished product. Closures, semi-rigid containers, preformed flexible pouches and flexible pouch roll stock contained in original wrappings may not be cleaned before use, subject to the conditions of handling by the processors or suppliers.

3.2.1 Glass jars and metal closures (caps or lids)

Only heat resistant glass jars and metal closures should be used. The glass jars should be properly inspected for cracks, chips and other defects. These should be washed with clean water to eliminate dirt and foreign matter. Metal closures should be provided with heat resistant liners and should be free from scratches, dents and other defects. It must also be provided with a self-sealing compound that will effect a hermetic seal after thermal processing.

Glass jars may be reused provided these are sound, and properly washed and sanitized. All metal closures shall never be reused. Shrinkable plastic cap seals, when used to prevent tampering, protect bottleneck contamination and other physical damages, should fit the size of the closures and glass jars.

3.2.2 Metal containers

Two or three piece tin or aluminum cans should be inspected for integrity of side seam and double seams, general cleanliness and presence of defects. If necessary, suitable inside linings may be used as required by the product.

Annex B presents the description of containers commonly used for sweet preserves.

3.2.3 Semi-rigid and flexible containers

Preformed heat resistant and retortable containers may be used provided they are suitable for the products, and free from pinholes, scratches, blisters and other defects. The pouch seal area must be free from contamination and wrinkles.

4 Preparation and processing of sweet preserves

4.1 Preparation of cooking and packing syrup

Syrup of required strength should be prepared by dissolving refined sugar in water. It should be heated to dissolve all the sugar crystals and filtered to remove any foreign matter present. Syrup strength should be checked with a refractometer and adjustments made either with addition of more sugar or water.

Syrups are classified on the basis of total soluble solids (°Brix) of the finished product after equilibrium:

Extra light syrup	-	not less than 10°Brix to below 14°Brix
Light syrup	-	14°Brix to below 18°Brix
Heavy syrup	-	18°Brix to below 22°Brix
Extra heavy syrup	-	22°Brix and above

Annex C presents the weight per liter of sugar (sucrose) solutions.

pH of syrup should be adjusted, if necessary, to conform to specific requirements for acidified products. Care should be taken that the suitable quality and correct amount of appropriate acidifying agents (e.g., citric acid, fumaric acid) is added and uniformly mixed to each batch of syrup prepared. A pH meter should be used to determine the pH of the syrup.

4.2 Acidification process

To produce products with a pH of 4.6 or less, acidification must be properly carried out. It is important that perishable ingredients must not be contaminated before acidification and until an equilibrium pH of 4.6 or less is reached.

Annexes D and E present the recommended acidification methods and the critical control points in the production of acidified foods.

4.3 Preparation of raw materials for thermal processing

The preparation of fruits, legumes and mixed preserves are described separately from receipt of raw materials until the pre-filling operations, which are as follows:

4.3.1 Fruits

4.3.1.1 Receiving of raw materials – Fresh fruits like banana, jackfruit (*langka*), coconut sport (*macapuno*) and young coconut (*buko*), and sugar palm (*kaong*) should be accepted as sound and suitable in the processing of sweet preserves. Those that have shown any signs of deterioration should not be used.

4.3.1.2 Inspection and sorting – Prior to processing, the fruits should be inspected and sorted. Fruits must be fully matured/properly ripened.

a) Banana (*saba* variety) should be rare ripe (80% yellow and 20% green peel color). It should be free from internal and external defects, with no evident insect, fungal, disease or physical damage.

b) Jackfruit should be fully mature and firm, and should be free from excessive bruises and insect infestation. Jackfruit bulbs recovered from the fruit should be collected fresh and chilled, with firm texture and yellow to golden yellow in color.

c) *Macapuno* should be matured. Dehusked nuts should be free from dirt and any surface defects like cracks and mold growth. The meat should be firm, white to creamy white in color and free from off-flavor, like rancidity.

d) *Buko* should be from seven- to eight-month old from pollination, or at the *malakanin* stage. The meat should be firm and white to creamy white in color. It should also be free from any off-odor or off-flavor. *Buko* strings recovered from the nut by the suppliers must be collected fresh and chilled. It should have a firm texture and free from discoloration and foreign matter.

e) *Kaong* should be mature and soaked in potable water. It should be white in color, opaque or translucent, firm and free from fermented or spoiled odor. It should also be free from dark embedded fibers, embryo and peels.

4.3.1.3 Washing and/or cleaning – Raw materials should be washed immediately after receipt and stored under conditions that will protect them from contamination and deterioration.

Banana should be washed/rinsed with chlorinated water before peeling. *Kaong* seeds should be repeatedly washed in water until free from acidic odor.

4.3.1.4 Cutting, slicing and separation of edible portion – These steps should be done as soon as possible to prevent contamination. Jackfruit should also be properly trimmed and any attached fibers should be carefully removed. *Macapuno* and *buko* may be collected using stainless steel scoops, shredders or any suitable utensils. Utmost care shall be observed to avoid parings from being mixed with the edible portions.

4.3.1.5 Soaking in water or any suitable soaking medium – This should be done in such a way that the fruit is completely immersed in the soaking medium for the required soaking period. To prevent the fruits from floating on top of the soaking medium, weights like stainless steel screens and perforated plastic trays are recommended. Weights made from wood shall never be used to prevent contamination.

Sulfite may be added. If the finished product has a residual concentration of sulfite that exceeds 10ppm, sulfite should be declared on its label (USFDA).

4.3.1.6 Pre-cooking – This may be done by boiling the raw material in water to soften it in order to attain the required texture. For bananas, boiling is done first until tender, then cooled and peeled. For *kaong* and *nata,* boiling is practiced to leach out undesirable fermented or acidic flavor.

4.3.1.7 Cooking in syrup – The prepared fruits may be cooked or boiled in syrup of required strength, the amount of which should be sufficient to cover the fruits during boiling. The fruits should be occasionally stirred during boiling to allow even cooking. The fruits should be cooked until the required degree of sugar penetration is achieved.

Cooked fruits should not be allowed to remain at room temperature longer than 8 hours; otherwise, it should be held in cold storage to minimize microbial activity.

4.3.2 Legumes

4.3.2.1 Receiving and inspection of raw materials – Legumes in syrup should be prepared from sound, good quality dried legumes, such as kidney beans, red mung beans and chickpeas. Raw materials showing signs of infestation, excessive blemishes, fragments, and other defects should be rejected.

4.3.2.2 Storage of legumes prior to processing – Dried legumes should be stored at the shortest possible time to prevent infestation. Complete records of all incoming and outgoing materials should be maintained to ensure "first in - first out" (FIFO) practice.

4.3.2.3 Washing – The legumes should be washed by soaking and rinsing with sufficient potable water, to remove dirt, floating beans and other extraneous materials. After washing, the materials should be drained well.

4.3.2.4 Rehydration – The materials should be completely immersed in the soaking medium or water, with or without softening agents. Softening agents, like sodium bicarbonate and sodium citrate may be added to water, provided the amount used is within the level recommended by the BFAD.

4.3.2.5 Peeling – Legumes, like chickpeas, should be peeled before processing. Peeling may be done by boiling in lye (2-3% sodium hydroxide solution) or in sodium bicarbonate solution followed by thorough washing in water.

4.3.2.6 Boiling in water – The rehydrated and/or peeled legumes should be boiled in water until soft, and then drained.

4.3.2.7 Cooking in syrup – The legumes may be cooked in syrup of required strength, the amount of which should be sufficient to cover the materials during cooking. The legumes should be occasionally stirred to allow even cooking.

4.3.3 *Nata*

4.3.3.1 Receiving and inspection of raw materials – *Nata* should be grown under sanitary conditions, and free from visible filth and other extraneous matters.

4.3.3.2 Cutting and sorting – Slabs of *nata* should be cut uniformly using sharp stainless steel knives or any appropriate cutters to prevent excessive warping of the raw materials. Cut *nata* should be sorted for the presence of filth by laying materials on mounted semi-transparent plastic sheet illuminated underneath fluorescent lamps, and removing those with embedded filth or extraneous materials. Rejected pieces should be discarded.

4.3.3.3 Holding/Storage – *Nata* pieces for storage and holding should be completely immersed in acidified water with a maximum pH of 3.5. All holding/storage containers should be properly covered.

4.3.3.4 De–acidification – Cut *nata* should be washed in several changes of water to remove the acidic taste and odor. Free flowing water or mechanical washers may also be used to accomplish this. Boiling in several changes of water should be done to completely leach out undesirable acidic flavor.

4.3.3.5 Cooking in syrup – The prepared *nata* should be cooked or boiled in sufficient amount of syrup of required strength. Coloring and flavoring substances may be added during cooking. Occasional to frequent stirring should be done during cooking until the desired texture and sugar penetration is achieved.

4.3.3.6 Holding the pre-cooked *nata* prior to filling – Pre-cooked *nata* should be kept in syrup at room temperature not longer than 8 hours to allow more sugar penetration. Cold storage is required when holding in syrup exceeds 8 hours to minimize microbial activity.

4.3.4 Mixed preserves (*halo-halo*)

4.3.4.1 Receipt and/or processing of semi-processed ingredients – The raw materials in the processing of mixed preserves should include, at least, five of the following pre-cooked products such as *nata,* red mung beans, white kidney beans, sugar palm fruit, jackfruit, coconut, banana, and chickpeas, all packed in syrup, and purple yam.

The above ingredients may be prepared using the procedures provided in Sections VI C. #1 for fruit preserves such as *kaong*, *macapuno*, banana and jackfruit; #2 for legumes such as kidney beans, red mung beans and chickpeas; and #3 for *nata*. The procedure in the processing of yam or *ube* jam is presented in Annex F.

4.3.4.2 Packaging and storage of semi-processed sweet preserves – The pre-cooked ingredients should be properly packed and stored in suitable containers to protect them from contamination. Cold storage is required when holding in syrup exceeds 8 hours.

4.4 Filling of containers

The filling of containers either mechanically or manually, should be controlled to meet the filling and headspace requirements specified in the scheduled process. Properly filled containers should result in cut-out net weight equivalent to at least 90% of the water capacity of the container. Overfilling can lead to contamination of seals, which can affect container integrity.

The food material may be packed hot or cold into glass jars, cans or pouches. Jars for hot filling may be dipped in hot water before filling to prevent thermal shock or breakage. During filling, contamination of sealing areas with product should be avoided. They should be kept clean and dry to obtain a satisfactory closure.

After filling, the filled jars may be carefully tapped at the bottom of the bottle to settle the contents and obtain a full pack. Subsequently, the packing syrup is added to cover the product until the correct headspace is achieved. Hot syrup should be added to shorten exhausting period and help displace trapped air.

4.5 Exhausting of filled containers

Exhausting of filled containers should be controlled to create the necessary vacuum upon cooling. It also prevents/minimizes corrosion of closures and removes air that would cause loss of color, flavor and vitamins. This may be done by heat exhausting, hot filling, steam injection or mechanical/ vacuum exhausting.

During heat exhausting, the temperature of the contents should reach at least 65°C. This would be sufficient to produce vacuum readings of 8-12 psi (5.5-13.6 inch Hg or 18.6-46.2 kPa) in the finished product.

4.6 Closing or sealing of containers

Seams and other closures should be air tight and secure to meet the requirements of the processors.

Self-sealing metal caps or lids should be tightened and secured to each filled jar before thermal processing. No further tightening during and after processing should be done, to avoid breaking the seal that could result to leakage.

To prevent leakage and contamination, the sealing surface should be free of defects and damage. After closing, the caps should be essentially level, not cocked or tilted, and seated well down the finish. The diameter across the finish of the jar should be less than that of the diameter across the container. This will prevent damage caused by bumping adjacent containers as they move along conveyors.

The pouch seal area must be free of food material and wrinkles in order to form adequate heat seals. Sealing temperature, pressure and dwell time should conform to the packaging material specifications.

4.7 Coding of sealed containers

Codes of sealed containers should be indelible with details of production date, batch code, product code, the manufacturing plant, the production line in which product is packed and other information necessary for product traceability. Where the container does not permit the code to be embossed or inked, the label should be legibly perforated or otherwise marked, and securely affixed to the product container.

4.8 Washing of sealed containers

Washing of filled and sealed glass jars and metal cans should be done using hot water to remove grease, dirt and product adhering firmly on the outside surface of the container. The use of low temperature water for washing glass containers may lead to breakage.

4.9 Thermal processing of sealed containers

Thermal processing should start as soon as possible after closing or sealing the containers to prevent unnecessary decreases in product temperature.

Processing schedules for specific formulations of sweet preserves should be calculated by competent personnel/laboratories, with the necessary approval by recognized authority.

The procedure in establishing the required heat treatment for a product can be divided into two steps. First, the required heat process to achieve commercial sterility is established on the basis of factors such as microbial flora, including *Clostridium botulinum* and spoilage microorganisms, container size and type, pH of the product, product composition or formulation, levels and types of preservatives, a_W, and the likely storage conditions.

The second step is to determine the scheduled process by carrying out heat penetration tests on the basis of sterilizing facilities available and the desired product quality. The temperature at the slowest heating point in the container contents should be monitored during the tests. An adequate number of heat penetration tests should be done to determine the variations that should be taken into account in the scheduled process.

4.10 Low-acid foods

4.10.1 Low acid with a_W >0.90

Low-acid foods with pH of 4.6 or higher and a_W above 0.90 should be sterilized at 115.6°-121°C (240°-250°F), which is equivalent to a pressure of 10-15 psi (50.3-60.4 inch Hg or 170-205 kPa) at processing times specified in the scheduled processes. The scheduled processes should be adequate to destroy the spores of *Clostridium botulinum*, a food poisoning, heat resistant bacterium that survives in improperly processed low-acid foods. Appropriate sterilization equipment for low-acid foods packed in glass jars, cans and pouches should be used.

4.10.2 Low acid with $a_W \leq 0.90$

Sweet preserves with a_W of 0.90 and lower, are processed on the combined effect of low a_W and pasteurization temperature at 100°C (212°F) to prevent the growth of *Clostridium botulinum*. Water activity is controlled by the addition of humectants that bind or reduce free moisture in foods. Examples of these humectants are sugar, salt, glycerol, propylene glycol, sorbitol, invert sugar and high fructose syrup.

4.10.3 Acid/acidified foods

Acid and acidified foods with equilibrium pH of 4.6 and below, regardless of a_W, may receive a heat treatment less than that necessary for low-acid foods. The low pH of these products is generally adequate to prevent the growth of *Clostridium botulinum* and other spore forming bacteria.

When properly acidified and the required pH maintained, these products can attain commercial sterility through pasteurization at 100°C (212°F), or lower. This is sufficient to destroy mold, yeasts and vegetative cells of bacteria, and to inactivate enzymes. Heat processing systems include steam retorts at atmospheric pressure, water bath processors and steamers capable of processing up to 100°C (212°F), provided that the slowest heating point of the product reaches pasteurization temperature.

4.11 Thermal processing room operations

Scheduled processes and retort venting procedures for each product and container size being packed shall be posted in a conspicuous place near the processing equipment. Such information should be readily available to the retort or processing system operator and auditors/ inspectors of the Bureau of Food and Drugs.

All retort baskets, trucks, cars or crates containing un-retorted food products shall be conspicuously marked with heat sensitive indicators or other effective identifying markers.

An accurate wall clock must be posted where it is clearly visible from the retort operator's station.

4.12 Cooling of processed products

Cooling of finished products is dependent on the thermal processing systems used. Low-acid products processed in water retorts with air overpressure are cooled in the same heating equipment. Precaution should be taken not to abruptly reduce pressure during cooling of glass jars and pouches. Air cooling is recommended for products packed in glass jars.

To avoid thermophilic spoilage and/or organoleptic deterioration of the product, the containers should be cooled as rapidly as possible to an internal temperature of 40°- 50°C (104°-122°F).

Cooling water must be of low microbial content, which can be achieved by adequate chlorination. The minimum level of residual free chlorine for cooling water is 0.5ppm. Chlorine levels in excess of this may accelerate corrosion of certain metallic containers. The residual chlorine in cooling water should be maintained and recorded.

4.13 Washing and drying

The finished products may be washed in warm water to remove adhering product particulates, and immediately dried. Pouches may be dried promptly using appropriate dryers.

To control post-process leakage contamination or leaker infection in glass jars and cans, processed containers should be dried as soon as possible after processing so that exposure to post-wet retorting, conveying and handling equipment is minimized.

4.14 Post process container handling

Mechanical shocks leading to leaker infection and breakage of glass containers due to container abuse should be avoided and minimized. This occurs by knocking against each other during conveying, packaging and labeling operations, among others.

Before unloading crates, water should be drained from container surfaces by tilting the crates as far as possible and allowing sufficient time for the water to drain. Processed containers should not be manually handled while wet.

Pouches should be handled singly rather than in bunches, and care should be exercised so as to prevent damage by roughened contact surfaces.

5 Inspection and labeling

5.1 Inspection of finished products

All processed products should be inspected before labeling and casing, and defective products should be withdrawn or rejected. The company should have an approved policy or procedure in handling defective or rejected products based on AO 153 series of 2004 (Revised Guidelines on the Current Good Manufacturing Practices in Manufacturing, Packaging, Repacking or Holding Food).

5.2 Labeling

Labeling should be done after the prescribed incubation period when the product has passed quality evaluation. All containers should be properly labeled. The label should conform to the rules and regulation of BFAD.

5.3 Tamper-evident seals

Tamper-evident seals are highly recommended.

6 Quality assurance

6.1 Record keeping

Permanent and legible dated records of time, temperature, code mark and other pertinent details should be kept concerning each load. Such records are essential as a check on processing operations.

Record of time steam on, venting time and temperature, time sterilization temperature reached and time steam off should be kept concerning each load.

Written records of all container closure examinations should specify the code lot, the date and time of container closure inspections, the measurements obtained, and all the corrective actions taken.

Records should be maintained identifying initial distribution of the finished product to facilitate, if necessary, the segregation of specific food lots that may have been contaminated or otherwise unfit for intended use.

6.2 Deviations in processing

Whenever in-process monitoring records disclose that a product has received a thermal or sterilization treatment less than that stipulated in the scheduled process, the processor should:

6.2.1 Identify, isolate and then reprocess that portion of the production involved. Complete reprocessing records should be retained; or

6.2.2 Set aside that portion of the product involved for further evaluation as to any potential public health significance. Such evaluation shall be made by competent processing authority and shall be in accordance with recognized procedures. A record shall be made of the evaluations made and the results. After the determination that no significant potential for health hazard exists, that portion of the product involved may be distributed. Otherwise, that portion of the product shall be destroyed.

All process deviations involving failure to satisfy the minimum requirements of the scheduled process shall be recorded detailing those deviations and the actions taken.

6.3 Hazard analysis critical control points (HACCP)

HACCP should be developed for each sweet preserve. Prior to the development of HACCP plans, establishments should have developed, documented and implemented prerequisite programs based on Good Manufacturing Practice (GMP) and Hygiene Control. An effective GMP and Hygiene Control programs will decrease the number of critical control points that a manufacturer must face during the hazard analysis of the product/process.

Guidelines for the Application of the Hazard Analysis Control Point (HACCP) System (Source: CAC/GL 18-1993) presents the recommended sequence and document formats for application of the HACCP systems.

7 Storage and transport of finished products

Storage and transport conditions of the finished product should be such that the integrity of the product container, and the safety, and quality of the product are not adversely affected. Extreme fluctuation in temperature during storage and transport of the product should be avoided.

8 Laboratory control procedures

Each food-processing establishment should have access to laboratory control of both the processes used and the finished products. All ingredients and food product declared unfit for human consumption by the laboratory should be rejected.

Representative samples for each lot or batch should be taken to assess the safety and quality of the product.

Microbiological laboratory for pathogenic organisms should be separated from the processing area, and no pathogenic organisms should be handled within the premises of the manufacturing plant.

Laboratory procedures for quality control of the processes and product should follow recognized or standard methods for easy interpretation of results.

9 End product specifications

Appropriate methods should be used for sampling analysis and determinations to meet the following specifications:

9.1 To the extent possible in good manufacturing practice, the products should be free from any objectionable characteristics.

9.2 The product should not contain any pathogenic organisms or any toxic substances originating from microorganisms.

9.3 The product should be free from chemical pollutants in amounts, which may represent hazard to health.

9.4 The product should comply with the requirements set forth by the *Bureau of Food and Drugs and the Codex Alimentarius Commission on Pesticide Residues and Food Additives.*

9.5 Products with an equilibrium pH above 4.5 should have received a processing treatment sufficient to destroy all spores of *Clostridium botulinum*, unless growth of surviving spores would be permanently prevented by product characteristics other than pH.

Annex A

Standard parameters and values for drinking water quality

Table A.1 – Standards values for bacteriological quality

Source and mode of supply	Bacteria	Standard value (no./100 mL)
a. All drinking water supplies under all circumstances (Level I, II, III bottled water and emergency water supplies)	*E. coli* or thermotolerant (fecal) coliform bacteria	0
b. Treated water entering the distribution system	*E. coli* or thermotolerant (fecal) coliform bacteria	0
c. Treated water in the distribution system	*E. coli* or thermotolerant (fecal) coliform bacteria	0
	Total coliforms	must not be detectable in any 100 mL sample. In any case of large quantities where sufficient samples are examined, it must not be present in 95% of samples taken throughout any 12-month period.

Table A.2 – Standards values for physical and chemical quality: aesthetic quality

Constituent maximum or characteristics	Level (mgL)
Taste	Unobjectionable
Odor	Unobjectionable
Color	5 TCU
Turbidity	5 NTU
Aluminum	0.2
Chloride	250
Copper	1
Hardness	300 (as $CaCO_3$)
Hydrogen sulfide	0.05
Iron	1
Manganese	0.5
pH	6.5 - 8.5
Sodium	200
Sulfate	250
Total dissolved solids	500
Zinc	5
Sec. 2. Philippine National Standards for Drinking Water. Department of Health. Manila, Philippines. 1993	

Annex B

Commonly used containers for sweet preserves

Container no.	Description	Net capacity		Overflow capacity		Height		Largest body diameter, width and thickness	
		oz	g	oz	G	mm	inch	mm	inch
1. Glass jars									
1	Lourange	4.2	118	4.4	125.7	86.1	3.39	52.0	2.05
2	Lourange	6.2	177	6.5	184.8	98	3.86	57.2	2.25
3	Lourange	8.4	237	8.7	247.7	108.7-138.6	4.28-5.46	63.7	2.51
4	Lourange	12.5	355	13	369.6	123.8	4.87	71.4	2.81
5	Lourange	25.0	710	25.6	724.5	152.4	6	89.7	3.53
6	Lourange	33.4	946	34	964.7	171.4	6.75	97.4	3.83
7	Lourange	12.3	350	13	370	137	5.39	71.2	2.80
8	Lourange	8.8	250			113.4-115	4.46-4.53	66.3	2.61
9	Fancy wide mouth oval	12.5	355	13	369.6	136.9	5.39	74.6 x 63.5	2.94-2.50
10	Packer's jar	13.0	370	13	370	111.1	4.37	78.0	3.07
11	Squat jar	10.0							
2. Tin can									
12	211 x 300					76.2	3.0	68.3	2-11/16
13	211 x 400					101.6	4.0	68.3	2-11/16
14	307 x 409					115.9	4-9/16	87.3	3-7/16
15	401 x 411					119.1	4-11/16	103.2	4-1/16
16	603 x 700					177.8	7.0	157.2	

Annex C

Weights per liter of dugar (Sucrose) dolutions[1]

Degrees Brix[2]	Specific gravity at 20°C[3]	Wt. sugar per liter of syrup (kg.)	Wt. of water per liter of syrup (kg.)
0	1.00000	0.000	1.000
5	1.01965	0.051	0.961
10	1.03998	0.104	0.936
15	1.06104	0.159	0.920
20	1.08287	0.217	0.866
25	1.10551	0.276	0.829
30	1.12898	0.339	0.790
35	1.15331	0.403	0.749
40	1.17853	0.471	0.707
45	1.20467	0.542	0.663
50	1.23174	0.616	0.616
55	1.25976	0.693	0.567
60	1.28873	0.773	0.516
65	1.31866	0.857	0.462
70	1.34956	0.945	0.405
75	1.38141	1.036	0.345
80	1.41421	1.131	0.283
85	1.44794	1.231	0.217
90	1.48259	1.335	0.148
95	1.51814	1.440	0.076

[1] NBS Circular 44, C440; D.F. Charles, E.J. Culp Meade, "Cane Sugar Handbook"
[2] Degrees Brix = Percentage by weight of sucrose
[3] AOAC, 1995.

Annex D

Acidification procedures

To produce products which have a pH of 4.6 or less, acidification must be properly carried out. Here are some methods to obtain properly acidified foods:

D.1 Blanch the food ingredients in an acidified aqueous solution – Food particulates could be blanched in a hot acid bath. The ability to obtain a properly acidified product is dependent upon blanch time and temperature, as well as the concentration of acid.

D.2 Immerse the blanched foods in an acid solution – The product is blanched in the steam or water blancher, than dipped into an acid solution, removed from the acid solution, and placed into containers. The proper acidification depends upon how well the product is blanched, concentration of the acid, and contact time.

D.3 Direct batch acidification – Ingredients are mixed in a kettle, and acid is added directly to the batch. (An elevated temperature may improve the rate of acid penetration into solid particles.) The Ph of the batch is checked before the material is filled in containers.

D.4 Add acid foods to low-acid foods in controlled portions – The acid food is mixed with the low-acid food to get an acidified food product. The proportion of acid food to low-acid food is important to obtain uniform and accurate control of Ph of the finished product.

D.5 Directly add a predetermined amount of acid to individual containers during production – This involves addition of acid pellets, known volumes of fluid acid, or some other means of direct acidification of each container. This is the most common acidification process for sweet preserves packed in syrup, wherein a known concentration of acidulant is added to packing syrup.

Source: The Food Processors Institute. 1988.Canned Foods: Principles of Thermal Process Control, Acidification and Container Closure Evaluation. Washington, D.C.

Annex E

Critical control points in the production of acidified foods

For proper production of an acidified shelf-stable product, these are some critical control points that should be checked to ensure that the acidification procedure is under control.

E.1 Every container of food must be acidified in the same proportions.

E.1.1 When producing a solid-liquid mixture which will be acidified in the container by direct acidification, it is necessary to know and control the amount of solid material in each container. This permits the addition of the appropriate amount of acid to obtain a pH less than 4.6.

E.1.2 Know the buffering capacity of the food.

E.1.3 It is necessary to control the unit operations of peeling, blanching, exhausting, brining and closure. For example, some products are lye peeled, and if the lye carry-over is not controlled, the product will have a higher initial pH than accounted for in the formulation. The end result will be a product that is not in control, and which has a higher pH value than required. The operations that, according to the scheduled process, will affect the pH of the finished product must be controlled and recorded.

E.2 Monitor acidification by Ph measurement before and after equilibrium. The key is that the finished product Ph must be 4.6 or less. Finished product Ph means the Ph of the product (components included) in the final container after thermal processing – not the raw product Ph. The Ph measurements must be recorded and the records reviewed at the appropriate time intervals.

E.3 Monitor the scheduled thermal process. The objective of the thermal process is to destroy vegetative cells of microorganisms of public health significance and those of non-health significance capable of reproducing in the food under normal conditions of storage and distribution.

E.4 Container handling. Processed containers should be handled in such a manner as to minimize damage to the seals and/or product recontamination.

E.5 Products found to have an equilibrium pH greater than 4.6 shall be reprocessed as low-acid food to render it safe, or destroyed.

Source: The Food Processors Institute. 1988.Canned Foods: Principles of Thermal process Control, Acidification and Container Closure Evaluation. Washington, D.C.

Annex F

General procedure in the processing of yam or *ube* jam for mixed preserves

F.1 Select only yam tubers of suitable variety and maturity.

F.2 Wash thoroughly in water removing all dirt and other foreign matters.

F.3 Cook in water until the required texture is attained.

F.4 Cool to room temperature and peel completely.

F.5 Cut into cubes and pass thru food cutter or grinder.

F.6 Add sugar and/or other ingredients, if necessary, and cook in a kettle or cauldron with constant stirring until the required consistency is attained.

F.7 Cool to room temperature and pack in suitable bulk containers with or without plastic linings.

F.8 Use as ingredients for mixed preserves (*halo-halo*), or hold in cold storage if not used after processing.

Manufacturers:

Delicious Foods Corporation
Florence Foods Corporation
Festive Foods International Corporation
Jonas International Phil. Inc.
Pacific Isles International Trading Corp.
Reysons Food Processing
ERMA Industries
Lorenzana Foods Corp.
Dalisay Sweets International
Golden Hands Corp.
SAFI-UFC
Foodsphere Inc.
YS Commercial Enterproses
Karexx International
Fil-Choice Inc.
Escaba Foods
Mofels

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the references document (including any amendments) applies.

FAO, UN-WHO. 1995. General Requirements (Food Hygiene). Codex Alimentarius Volume IB

The Food Processors Institute. 1988. Canned Foods: Principles of Thermal Process Control, Acidification and Container Closure Evaluation. Washington, D.C.
USFDA

Department of Health
Bureau of Food and Drugs
Technical Committee on Recommended Code of Practice for Processing and Handling of Sweet Preserves

Bureau of Food and Drugs – Philippine National Standards Committee

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